U7860-1

Business In Nebraska

August 1989
Vol. 44 No. 539

Prepared by the Bureau of Business Research
200 College of Business Administration
University of Nebraska-Lincoln
Lincoln, NE 68588-0406
402/472-2334

Early Developments in Nebraska Irrigation

F. Charles Lamphear
Director
Bureau of Business Research

Merlin W. Erickson
Research Associate
Bureau of Business Research

Early settlers to Nebraska and surrounding areas generally found rainfall to be erratic and, at best, marginally adequate for agriculture, contrary to posters and published ads portraying a plains oasis. Land speculators promised settlers that "rain would follow the plow." In other words, rain would follow the migrants. Rain did not follow the migrants, however, and some left on the brink of starvation. Many that remained turned to irrigation as a way to develop a stable and prosperous agricultural economy.

Irrigation was not always popular with farmers and businessmen. Many viewed the presence of irrigation as a setback for agriculture, because use of supplemental water implied unsuitable agricultural conditions.

This article is the second in a series on the economic importance of irrigation in Nebraska. The first article, which appeared in the December issue of *Business In Nebraska*, examined the importance of irrigation to the state's economy for 1985. Free copies are available from the Bureau of Business Research (BBR) while supply lasts.

The current article studies irrigation development in Nebraska before 1940. Later articles will report irrigation development since 1940 and current BBR research on the economic importance of irrigation under different simulated drought conditions.

Irrigation came to Nebraska from California, where it had developed in the 1840s. Like the national movement, irrigation began in the western part of the state along the Platte River and gradually moved eastward and adjacent to the larger water courses.

Rudimentary irrigation projects developed along the Platte River near Fort Laramie in Wyoming as early as 1847. Water from these projects was used mainly to grow vegetables for sale to Oregon-bound immigrants.

The first actual irrigation ditch in Nebraska was constructed on the South Platte River in 1859, nine years before the state joined the union on March 1, 1867.

The earliest irrigation projects along the Platte in Wyoming and Nebraska were the work of individual farmers. The first cooperative effort in Nebraska did not occur until 1870 when a stock company was formed to divert water from the South Platte to irrigate 3,000 acres. The operation was abandoned after three years because of increased rainfall, seemingly fulfilling the land speculators' promise that rain would follow the settlers. The

State Economic Scoreboard

Change from same month one year ago
See Review and Outlook on page 8 for more details

	State	Metro+	Nonmetro
Motor Vehicle Sales (April) Constant $	-4.0%	-0.3%	-7.1%
Nonmotor Vehicle Sales (April) Constant $	10.1%	9.1%	11.2%
Building Activity (April) Constant $	-6.8%	-10.6%	-0.9%
Employment (June)	-0.1%	0.2%	-0.4%
Unemployment Rate* (June)	3.6%	3.7%	3.5%

+Omaha and Lincoln. *Unemployment is this month's rate, not a percent change from year ago.

period of abundant rainfall, however, was short-lived.

William E. Smythe, a key figure in the irrigation movement in the American west, wrote in 1891 that "The greatest single problem that concerns the development of Nebraska is the problem of irrigation." He further noted that "It is here that the test [of irrigation] must be made in order to prevent the retrogradation of the country back to wild prairie or mere grazing grounds—in order to prevent the cowboy from driving out the farmer and the homesteader." Smythe later reflected on his life and his involvement in the irrigation movement in his book entitled *The Conquering of Arid America* when he said "I had taken the cross of a new crusade. It was not merely a matter of ditches and acres, but a philosophy, a religion, and a program of practical statesmanship rolled into one."

Four factors largely contributed to the early development of irrigation: 1. abundant water; 2. the irrigation district statutes adopted beginning in 1895; 3. the Reclamation Act of 1902; and 4. the drought of the 1930s.

Irrigation as we know it today in Nebraska could not have been possible without an abundant water supply. The Platte River and its tributaries were major sources of water for the earliest irrigation projects. Nearly 90 percent, or over 130,000 acres, of the irrigated land in the state in 1900 was found within the drainage basin of the Platte River. In addition, about 9,000 acres in 1900 were irrigated from ditches supplied by the Republican River and its tributaries. Furthermore, some irrigation development had taken place in the extreme northwestern part of the state along the White River and its branches. Most of the ditches were small and privately owned. By 1900, water diverted from the Niobrara River was used to irrigate 7,317 acres.

The development of groundwater for irrigation was a later phenomenon. At the turn of the century, no comprehensive investigation had been undertaken of the state's geological structure to determine the prospects for groundwater development. A limited study on groundwater availability was made in the late 1890s for a 7,400 square mile area that included the counties of Scotts Bluff, Banner, Cheyenne, Box Butte, Dawes, Kimball, and Sioux. Study results showed a substantial variation in groundwater supplies and depths. The report noted that where the well system was employed, water was pumped by windmills into reservoirs and then diverted to the cultivated acres. In 1899, 843 acres were irrigated in this manner; nearly half of these acres were located in the study area.

In 1895, Nebraska enacted an irrigation code. The code created a comprehensive administrative system for acquiring and administering water rights. Professor David Aiken of the Department of Agricultural Economics at UN-L recently wrote that the "... [1895] code was absolutely necessary to developing large scale irrigation projects in Nebraska." The irrigation district statutes, a number of which were passed in 1895, provided the legal and financial tools necessary for irrigators to develop large scale irrigation projects. Those statutes gave irrigation districts the power to make assessments for water charges.

A group of 17 U.S. congressmen and senators from western states met in 1901 to formulate legislation to establish a revolving reclamation fund from the proceeds of western land sales for the construction of irrigation projects. Their initial efforts led to the passage of the Federal

Table 1
Irrigation Summary for Nebraska 1890-1940

Item	Census Year 1890	1900	1910	1920	1930	1935	1940
ALL LAND							
State Land Area (acres)	49,157,120	49,157,120	49,157,120	49,157,120	49,157,120	49,157,120	49,057,920
Land in Farms (acres)	21,593,444	29,911,779	38,622,021	42,225,475	44,708,565	46,615,762	47,343,981
Number of Farms	113,608	121,525	129,678	124,417	129,458	133,616	121,062
IRRIGATED LAND							
Number of Farms	214[1]	1,932[1]	1,852	3,021	4,602	5,140[2]	6,913
Area Irrigated							
Farm Reports (acres)	11,744	148,538	NA	199,815[3]	404,481[3]	345,417[4]	473,775[5]
Enterprise Reports (acres)	NA	NA	255,950	442,690	532,617	NA	610,379

[1] Reported as number of irrigators
[2] Farms reporting irrigated land from which crops were harvested
[3] Acreage of irrigated crops including some duplication where two or more crops were harvested from the same land
[4] Irrigated land from which crops were harvested
[5] Irrigated land from which crops were harvested plus 10,869 acres of irrigated land used only for pasture

Source: U.S. Bureau of the Census, *Sixteenth Census of the United States, 1940, Irrigation of Agricultural Lands: Nebraska* (Washington: GPO, 1941)

Reclamation Act in 1902. The Federal Reclamation Act enabled irrigation districts to obtain financial aid from the new Reclamation Service, later named the Bureau of Reclamation, which was made part of the Department of the Interior. The North Platte project was the first to be built in Nebraska under the act. Work started in 1905 on the North Platte project and essentially was completed with the construction of Guernsey Dam in 1927. The North Platte project supplied water to 165,000 acres in Nebraska.

The 1930s encompassed the driest decade in recorded history. In general, interest in irrigation grew in proportion to the intensity of the drought. The statewide corn yield averaged only 3.2 bushels per acre in 1934 and 2.5 bushels in 1936, compared with an average of 24 bushels per acre for the ten year period 1923 to 1932. Wheat, the second most important crop, yielded only 7.8 bushels per acre, compared with an average of 15.4 bushels for the prior decade. Many lost their farms because of their inability to make mortgage payments. The federal government provided various forms of assistance. One area of assistance involved Public Works Administration (PWA) funds. Congress made PWA funds available to public power and irrigation districts in 1935. Loans to the Tri-County, Sutherland, North Loup, and Middle Loup public power and irrigation districts were made from this federal government fund.

The Eleventh Decennial Census of the U.S. of 1890 was the first official U. S. irrigation census. A special census of irrigation was taken in 1902, followed by the regular decennial censuses of 1910, 1920, 1930, and 1940. In addition, a mid-decennial agricultural census that included irrigation was conducted in 1935.

Two sets of census statistics were compiled from these surveys. One set was based on farm and ranch response information. The second set was based on enterprise response information. Both sets are reported in Table 1, because the reported irrigation acreages differ substantially between the two sets.

A major reason for the reporting discrepancy between the two data sets is due to the way enterprises, especially large enterprises, reported irrigated acres. An irrigation enterprise was defined as an independent irrigation establishment that owned or operated works for supplying water to agricultural land. A farm was defined for enumerative purposes as an independent working unit or tract of land not less than three acres unless its agricultural products in the year preceding the enumeration were valued at $250 or more.

Farmers usually obtained rights from irrigation enterprises to water their entire farms. The enterprise, especially the larger enterprises, were not likely to know the exact acres irrigated, because their records showed water rights. In fact, some enterprise records showed only the quantity of water delivered to users. Moreover, many farms received water from more than one enterprise, no doubt resulting in multiple counting of irrigated acres.

The decennial and mid-decennial figures contained in Table 1 represent preceding year conditions. For example, the 1900 data reflect 1899 conditions. Nebraska's acreage in 1900 (1899) was reported at about 148,000 from farm reports, but it was likely greater. (See Table 1.) Severe drought conditions existed in 1899, and many ditches were abandoned or opened only in the early season. In many areas, crops that were watered only once were not reported as irrigated. According to the census, "It is exceedingly probable that a very large area of land partially irrigated is not included in the Census Report." In spite of statistical aberrations, the number of Nebraska irrigators increased over 800 percent during the 1890s, and irrigated acres swelled over 1,100 percent. (See Table 1.) The annual percent increase in irrigated acres for the 1890-1940 period averaged about 7.7 percent. The annual percent increase in the number of irrigated farms averaged about 7.2 percent, nearly equaling the rate of growth in irrigated acres. The actual

Table 2
Number of Irrigators and Acres Irrigated by County
1889 and 1899

Counties	Number of Irrigators 1900	Number of Irrigators 1890	Acres Irrigated 1900	Acres Irrigated 1890
State Total	1,932	214	148,538	11,744
Buffalo	20	*	1,393	*
Cheyenne	162	36	21,288	3,154
Dawes	105	12	4,027	267
Dawson	353	*	20,097	*
Deuel	101	4	11,794	125
Dundy	63	4	4,552	41
Holt	21	*	2,218	*
Keith	73	6	12,646	295
Kimball	21	11	4,225	441
Lincoln	200	37	22,508	3,049
Platte	46	*	1,488	*
Red Willow	31	3	1,542	72
Scotts Bluff	291	70	29,244	2,753
Sioux	50	23	1,433	1,316
All other counties	415	8	10,083	231

*No irrigation reported in 1889. Source: U.S. Bureau of the Census, *Twelfth Census of the United States 1900, Agriculture, 6, Part 2* (Washington: GPO, 1902)

Table 3
Irrigated Acres for Counties With at Least 2,000 Acres Irrigated in 1940 by Census Year

Counties	Years 1940	1930	1920
Box Butte	3,435 (22)*	2,400 (16)	2,162 (16)
Buffalo	24,076 (6)	12,236 (8)	3,019 (14)
Chase	2,520 (24)	2,060 (17)	2,292 (15)
Cheyenne	4,178 (20)	-	-
Custer	3,797 (21)	-	-
Dawes	14,301 (8)	9,911 (10)	9,005 (12)
Dawson	70,308 (3)	69,702 (3)	33,700 (4)
Deuel	8,585 (13)	6,857 (12)	10,317 (8)
Dundy	4,487 (18)	3,470 (14)	9,045 (11)
Garden	11,804 (9)	24,077 (6)	20,488 (7)
Garfield	2,187 (25)	-	-
Hall	10,875 (11)	6,425 (13)	-
Hitchcock	11,366 (10)	10,974 (9)	9,786 (9)
Kearney	6,730 (15)	-	-
Keith	16,690 (7)	23,141 (7)	25,832 (6)
Kimball	8,192 (14)	7,422 (11)	9,101 (10)
Lincoln	44,022 (4)	35,708 (4)	35,246 (3)
Loup	4,224 (19)	-	-
Merrick	2,878 (23)	-	-
Morrill	79,962 (2)	87,306 (2)	55,216 (2)
Phelps	4,502 (17)	-	-
Red Willow	4,542 (16)	3,256 (15)	4,013 (13)
Scotts Bluff	200,468 (1)	193,816 (1)	173,245 (1)
Sioux	32,824 (5)	25,578 (5)	29,796 (5)
Valley	9,288 (12)	-	-

*Numbers in parentheses indicate rank. Source: U.S. Bureau of the Census, *Sixteenth Census of the United States, 1940* (Washington: GPO, 1941).

number of irrigated acres declined between 1930 and 1935. This decline likely was due to the severe drought conditions of the 1930s. (See Table 1.)

The acreage figures presented in Table 2 show that irrigation in the 1890s was confined almost entirely to the western half of the state. For example, more than 75 percent of the total acreage reported as irrigated in 1900 was in the North Platte River valley.

Table 3 presents census information on irrigated acres by county for later periods. Only those counties with 2,000 or more irrigated acres in 1940 are listed individually. Numbers in parentheses indicate rank. Tables 2 and 3 show that Scotts Bluff County dominated all counties in the early period of irrigation development.

Irrigation was practiced on 1.4 percent of the farms of the state in 1910. (See Table 1.) In 1900, the proportion of irrigated farms was higher (1.6 percent), while in 1890 it was about 0.2 percent of all farms. The only county in which more than one-half the farms were irrigated in 1910 was Scotts Bluff, where the percentage was 62.2. In five other counties, the proportion was between 10 percent and 20 percent. In five additional counties, it was 5 percent to 10 percent.

From 1900 to 1910, the number of farms on which irrigation water was applied decreased 4.1 percent for the state as a whole. (See Table 1.) Only three of the counties for which comparative figures are available showed increases in the number of such farms, but in two of these the increases were large—368 percent in Sioux County and 141.2 percent in Scotts Bluff County. Both of these counties were affected in large part by the North Platte project of the United States Reclamation Service. Decreases in irrigated farms outside the three counties mentioned were largely due to a succession of wet seasons and a return to dryland farming.

The fact that there was an increase between 1900 and 1910 in the irrigated acreage but a decrease in the number of farms irrigated is explained by the abandonment of irrigation in parts of the state where it was practiced on a small scale and its extension in the western counties where the rainfall was less and where much larger parts of the remaining farms were irrigated.

Of the irrigated lands in 1900, 129,726 acres produced grain and roughage crops, and 18,812 acres were used only for pasture. Of the total crop area irrigated in 1900, 55.9 percent was in hay and forage. In 1910, the category garnering the largest irrigated acreage was wild, salt, or prairie grasses, representing 27.3 percent of the total irrigated acreage of the crops given in Table 4. Alfalfa was next, with 23.5 percent of this total; then corn, with 15.9 percent; followed by oats, with 13.9 percent. No other individual crop covered as much as 7 percent of the total acres irrigated. In 1890, 36.9 percent of the irrigated cropland acres produced wild, salt, or prairie grasses. In 1900, which is not shown in Table 4, almost a fifth of all irrigated land was pasture. Of the cropland irrigated, over 55 percent was devoted to hay and forage crops.

Table 4
Acreage of Crops Produced on Irrigated Land in Nebraska for 1889 and 1909

Crop	Acres 1889	1909
Cereals		
Corn	33,078	21,552
Oats	5,090	18,794
Wheat	14,143	9,015
Barley	940	3,495
Rye	741	427
Other	10	2,493
Seeds		
Alfalfa	*	1,192
Other	*	*
Hay and Forage:		
Alfalfa	22,172	31,842
Wild, Salt, or Prairie Grasses	47,890	37,019
Other	2,430	635
Other Crops		
Potatoes	1,075	6,077
Sugar Beets	*	3,114
Other	2,157	*

* No irrigation reported. Sources: U.S. Bureau of the Census, *Twelfth Census of the United States, 1900, Agriculture, 6, Part 2* (Washington: GPO, 1902) and U.S. Bureau of the Census, *Census of the United States, 1910, Agriculture, 6, Part 2* (Washington: GPO, 1912)

Table 5
Source of Water Supply
Irrigated Area: Acres

Source	1920	1930	1940
Streams	437,647	503,723	517,037
Wells	546	23,452	81,034
Lakes	-	336	251
Other*	4,497	5,106	12,057

* Includes springs, city water, stored storm water, sewage, waste water, seepage, and drainage. Source: U.S. Bureau of the Census, *Sixteenth Census of the United States, 1940, Irrigation of Agricultural Lands: Nebraska* (Washington: GPO, 1941)

Table 5 presents summary data on water sources for 1920, 1930, and 1940. The summary data show that groundwater was not a major source of water for irrigation in the earlier years. In 1940, wells provided water for about 13 percent of the total irrigated acres, nearly equaling the percentage offset in the decline in stream-fed irrigation.

The early history of irrigation in Nebraska includes public power development. Nebraska was the first and only all public power state in the U.S. All power that is generated is done by public agencies, either the hydro districts, municipalities, or the Bureau of Reclamation. All power is distributed by the public power districts, REA lines, or municipalities.

This article is the second in a series on irrigation in Nebraska. Free copies of the first article, which examined the economic importance of irrigation to the state's economy for 1985, are available from the Bureau of Business Research. Call 402/ 472-2334 to order.

Recommended Reading

Farm Exports for the 1990s

The USDA's Economic Research Service (ERS) is predicting a stronger demand for U.S. farm exports in the 1990s. They are quick to caution, however, that the 1990s most likely will not rival the fast pace of the 1970s, when the volume of U.S. farm exports grew on average about 9 percent a year.

ERS economists guard their prediction in light of several crucial questions:

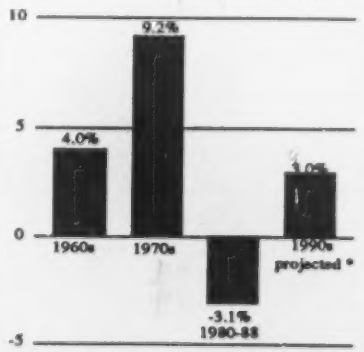
* Will competitors increase production because of current high prices for commodities prompted by the U.S. drought?
* Will developing counties let domestic food prices rise to levels that encourage their farmers to produce more food for their citizens?
* Will the Soviet Union boost its demand for soybean meal and other high protein foodstuffs?
* Will the outcome of current GATT negotiations remove barriers to agricultural trade?

The ERS economists observe that in recent years the U.S. has exported, on average, about one of every three acres of production—more that $16,000 per farm. Clearly when exports suffer, so does the U.S. farm sector.

The chart below shows a three percent growth rate projection for U.S. farm export volume in the 1990s.

For more information, see: "Export Outlook: What's Ahead for the 1990s" *Farmline*, USDA, ERS, Vol X, No. 4, April, 1989, pp. 4-7.

F. Charles Lamphear



* based on an ERS assessment of anticipated world supply and demand developments.

SOURCE: USDA's Economic Research Service

Rural Nebraska Loses Population

Provisional population estimates of Nebraska's counties for July 1, 1988 have been released by the U.S. Bureau of the Census. These estimates show that metropolitan counties and counties with medium size cities generally gained from 1980 to 1988, while rural counties lost population. There are exceptions to this trend. Seventeen counties grew, while the rest decreased in population

The fastest growing population was in the state's smallest county, Sarpy. The most populous county (Douglas, home of Omaha) grew 5.6 percent. Its gain of over 22,000 persons represented roughly two-thirds of the states' total growth. Lancaster County (city of Lincoln) experienced total growth of over 18,000 individuals, just under that of Douglas County. The jumps in these two counties pushed state growth to 2.1 percent despite numerous losses in smaller counties.

John S. Austin

Provisional 1988 County Population Estimates for Nebraska

(County estimates are rounded to the nearest hundred and state estimates to the nearest thousand. Percentages are based on unrounded numbers.)

State and County	July 1, 1988	April 1, 1980	% Change 1980-1988	State and County	July 1, 1988	April 1, 1980	% Change 1980-1988
Nebraska	1,602,000	1,569,825	2.1	Johnson County	4,800	5,285	-8.5
Adams County	30,400	30,656	-0.9	Kearney County	6,700	7,053	-5.3
Antelope County	8,400	8,675	-3.4	Keith County	8,700	9,364	-6.9
Arthur County	500	513	-8.2	Keya Paha County	1,100	1,301	-13.0
Banner County	1,000	918	6.2	Kimball County	4,500	4,882	-7.8
Blaine County	700	867	-16.1	Knox County	10,600	11,457	-7.2
Boone County	7,000	7,391	-5.9	Lancaster County	211,600	192,884	9.7
Box Butte County	14,000	13,696	2.4	Lincoln County	33,700	36,455	-7.6
Boyd County	3,100	3,331	-6.5	Logan County	1,000	983	-0.2
Brown County	3,900	4,377	-10.8	Loup County	800	859	-6.6
Buffalo County	37,000	34,797	6.3	McPherson County	600	593	-6.9
Burt County	8,300	8,813	-5.7	Madison County	32,300	31,382	3.0
Butler County	9,100	9,330	-3.0	Merrick County	8,500	8,945	-5.1
Cass County	22,100	20,297	9.1	Morrill County	5,700	6,085	-6.1
Cedar County	10,700	11,375	-6.0	Nance County	4,400	4,740	-7.5
Chase County	4,600	4,758	-3.8	Nemaha County	8,300	8,367	-0.3
Cherry County	6,500	6,758	-3.8	Nuckolls County	6,200	6,726	-7.2
Cheyenne County	10,000	10,057	-0.3	Otoe County	14,500	15,183	-4.4
Clay County	7,600	8,106	-6.7	Pawnee County	3,500	3,937	-9.9
Colfax County	9,200	9,890	-7.2	Perkins County	3,600	3,637	-1.8
Cuming County	11,000	11,664	-6.1	Phelps County	9,800	9,769	0.7
Custer County	12,800	13,877	-7.7	Pierce County	8,400	8,481	-0.8
Dakota County	17,200	16,573	3.8	Platte County	30,400	28,852	5.3
Dawes County	9,200	9,609	-4.6	Polk County	5,900	6,320	-6.3
Dawson County	20,700	22,304	-7.1	Red Willow County	12,600	12,615	-0.1
Deuel County	2,300	2,462	-6.8	Richardson County	10,200	11,315	-9.9
Dixon County	6,600	7,137	-7.1	Rock County	2,200	2,383	-8.7
Dodge County	35,400	35,847	-1.3	Saline County	12,900	13,131	-1.5
Douglas County	419,400	397,038	5.6	Sarpy County	98,200	86,015	14.2
Dundy County	2,700	2,861	-6.4	Saunders County	18,700	18,716	-0.1
Fillmore County	7,400	7,920	-7.0	Scotts Bluff County	37,100	38,344	-3.2
Franklin County	4,000	4,377	-9.2	Seward County	15,900	15,789	0.9
Frontier County	3,400	3,647	-7.9	Sheridan County	7,300	7,544	-3.1
Furnas County	5,900	6,486	-9.5	Sherman County	3,900	4,226	-8.6
Gage County	23,200	24,456	-5.3	Sioux County	1,600	1,845	-12.1
Garden County	2,700	2,802	-3.3	Stanton County	6,600	6,549	0.8
Garfield County	2,100	2,363	-9.3	Thayer County	7,000	7,582	-7.0
Gosper County	2,100	2,140	-3.4	Thomas County	900	973	-4.0
Grant County	800	877	-7.6	Thurston County	7,100	7,186	-1.9
Greeley County	3,200	3,462	-8.4	Valley County	5,600	5,633	-0.5
Hall County	48,600	47,690	1.8	Washington County	16,000	15,508	3.3
Hamilton County	9,100	9,301	-2.7	Wayne County	9,800	9,858	-0.9
Harlan County	4,000	4,292	-6.9	Webster County	4,500	4,858	-6.9
Hayes County	1,200	1,356	-8.3	Wheeler County	1,000	1,060	-7.6
Hitchcock County	3,900	4,079	-4.9	York County	14,900	14,798	0.4
Holt County	13,100	13,552	-3.3				
Hooker County	1,000	990	2.8				
Howard County	6,400	6,773	-5.6				
Jefferson County	9,100	9,817	-6.9				

Source: These estimates will be published August 1989 in *Current Population Reports*, Series P-26, No. 88-A "County Population Estimates: July 1, 1988, 1987, and 1986"

Per Capita Income or Average Income?

Several recent BIN articles on personal income have fueled debate among our readers. Their concern centers around the term *per capita personal income*. The basic question under fire is: What does per capita personal income really measure?

By definition, per capita income is one type of arithmetic average. It divides total income by total population, hence the expression per capita (or per person) income. It frequently is used for comparative purposes. But is per capita income a representative measure of average income?

Let's consider two areas called A and B. To simplify discussion, suppose areas A and B have the same total personal income for some accounting period. Let's further assume that area B's population exceeds area A's population. Based on the given information on population and personal income, we can say area A's per capita income exceeds area B's per capita income. Using per capita income to rank the areas, area A would be ranked above area B.

What more can we say about the income situation of the two areas? Can we say that the average income of area A exceeds the average income of area B? On the basis of definition, we can. Per capita income is one measure of average income.

There are other ways to calculate average income, however, such as the median. We would need individual income figures to calculate each area's median income, because the base for the median is the total number of income earners, rather than total population.

It is possible that area B's median income exceeds area A's median income, even though area A has higher per capita income. Moreover, it is possible that the mean average income of each area, another way to calculate average income, exceeds the area's median income, and so on.

There are several ways to calculate average income. The best average measure to use depends on the purpose. For example, if the average is supposed to reflect average well-being, then the per capita measure may be appropriate. Per capita personal income divides the total income pie into equal shares.

This does not mean, however, that every man, woman, and child actually received an equal share of the income pie. If the average is supposed to represent an area's average earned income, then per capita income would be inappropriate. In my judgment, the median would be most appropriate in this case.

The Bureau of Economic Analysis (BEA) of the U.S. Department of Commerce compiles the official income series that includes average per capita income statistics for states and counties.

BEA generates county personal income from several sources. The main source for the wage and salary component of personal income is state unemployment insurance (UI) records. Under the Ui program, every covered private firm or government agency is required to file quarterly contribution reports with the appropriate state agency.

BEA must estimate wage and salary figures for the noncovered segment. In the private sector, farms, farm labor contractors, railroads, elementary and secondary schools with religious affiliation, religious membership organizations, and private households are treated as noncovered entities. In the public sector, the military is noncovered.

In addition to the wage and salary component, personal income includes proprietors' income; dividends, interest, and rent; and various transfer payments. BEA estimates the nonwage and salary components of personal income from various government records, including individual tax records.

In short, BEA's personal income series for states and counties is based on estimates that may contain error. The amount of error is likely much greater for sparsely populated rural counties than it is for their urban counterparts. Apart from interpretational concerns over per capita income, the possible presence of estimation error should lead to skepticism about the reliability of county per capita income statistics, especially for rural counties.

F. Charles Lamphear

NEBRASKA VEHICLE REGISTRATIONS

More than 1.5 million vehicles were registered in Nebraska between January 1, 1988 and December 31, 1988. The *1988 Annual Report of the Nebraska Department of Motor Vehicles* contains several categories for vehicle registration:

Type	Number Registered
Passenger	882,451
Truck	385,020
Trailer	160,844
Motorcycle	29,088
Mobile Home	28,095
Government	22,336
Dealer	9,504
Tax-Exempt	2,264
Bus	993
Snowmobile	918
Total	1,521,513

There are 43 subcategories to the above, ranging in size from one "local bus" registration to 850,115 "regular passenger" registrations. By combining similar subcategories, there were 17,588 nonresident and 11,112 prestige registrations. In addition, there were 1,472 amateur radio, 214 ex-POW, and 199 Pearl Harbor Survivor registrations.

Merlin W. Erickson

The Low Cost Place to Raise Our Kids

According to the USDA's Family Economics Research Group, the low cost location for raising children is the rural Midwest. It costs $93,704 at today's prices to raise a child from birth to age 18 in the Midwest.

The biggest expense item is housing, making up one-third of the total. Other major items include food at home, transportation, and other miscellaneous items. These three categories combined account for approximately one-half of total expenses.

Contrary to many conceptions, the high cost location is not the urban Northeast, but the rural West. The total cost in the rural West is $117,000. (Note: It is possible that some suburban areas are included in rural totals.)

John S. Austin

Review and Outlook

John S. Austin

National Outlook

The gurus of the soft landing concept had their dreams come true in the latest economic data. Price inflation has slowed, as has the growth rate of economic activity. Consequently, the Federal Reserve has eased monetary policy. Now the gloom and doom forecasters once again are postponing the start date for their predicted recession. The long awaited recession refuses to emerge. The one common thread among all schools of economic thought is an agreement that slow growth rates will characterize the next few quarters.

Advance estimates of the second quarter GNP figures were released by the Bureau of Economic Analysis (BEA). These figures will be revised over the next two months. Second quarter figures show a fairly weak gain in real GNP. The weak second quarter showing is no surprise, in contrast to first quarter performance figures that were inflated to account for last year's drought. Second quarter real GNP rose 1.7 percent. This contrasts with the rapid gain of 3.7 percent in the newly revised first quarter estimate. The first quarter drought adjustment was 2.2 percent. Without the adjustment, the first quarter would have grown a mere 1.5 percent.

Evidence of the second quarter's weakness was apparent even to a casual reader of the business pages. Retail sales were off substantially in the second quarter, down 0.4 percent in June following a 0.1 percent drop in May. Weaker auto sales precipitated the drop in retail sales figures. Retail sales without autos advanced 0.1 percent in June and 0.4 percent in May. In addition, industrial production was down 0.2 percent in June. Industrial production has wobbled in a narrow band, showing little to no growth in the first six months of this year.

Advances in the components of second quarter real GNP varied widely. Real personal consumption increased 1.1 percent, despite a 4.0 percent decrease in nondurable purchases. The latter decreases were mostly in food and energy. The investment sector jumped 7.6 percent, with an advance in investment in equipment offsetting decreases in private construction. Government purchases advanced 4.0 percent, with a big gain from nondefense federal purchases. That gain was due to an increase in the Commodity Credit Corporation inventory.

Although signs of weakness in economic activity normally would be viewed as bad news, exceptionally good news about prices offsets any tendency toward doomsaying. The Consumer Price Index (CPI) advanced a slight 0.2 percent in June. Food and energy prices decreased in June, with retail energy prices falling 1.0 percent. Nevertheless, the CPI was 5.2 percent above year ago levels. The Producer Price Index decreased 0.1 percent in June. Thus, the rising inflationary tide appears to have been temporarily broken.

There is some speculation that wholesale energy prices are headed downward. At this writing (late July), a major slump in wholesale oil prices is underway. Should

Table I
Income and Earnings in Nebraska*
(millions of dollars)

	Second Quarter 1987	Third Quarter 1987	Fourth Quarter 1987	First Quarter 1988	Second Quarter 1988	Third Quarter 1988	Fourth Quarter 1988	First Quarter 1989	% Change 1989:1 vs Year Ago
Income									
Total Personal Income	22,151	21,895	24,562	24,004	24,900	23,921	24,347	25,937	8.1
Nonfarm	20,474	20,816	21,240	21,508	21,749	22,071	22,625	23,103	7.4
Farm	1,677	1,079	3,322	2,496	3,150	1,851	1,721	2,834	13.5
Earnings by Industry**									
Ag Serv., For., & Fish.	82	85	91	95	94	95	99	98	3.2
Mining	51	55	56	51	54	52	50	51	0.0
Construction	884	871	906	990	949	904	973	1,048	5.9
Manufacturing	2,134	2,206	2,253	2,338	2,340	2,393	2,395	2,462	5.3
Nondurable	1,067	1,094	1,121	1,141	1,162	1,175	1,182	1,229	7.7
Durable	1,067	1,113	1,132	1,197	1,178	1,218	1,214	1,224	3.1
TCU	1,560	1,597	1,612	1,647	1,676	1,723	1,709	1,758	6.7
Wholesale Trade	1,114	1,140	1,158	1,197	1,215	1,252	1,280	1,326	10.8
Retail Trade	1,508	1,522	1,540	1,581	1,607	1,639	1,671	1,712	8.3
FIRE	1,131	1,159	1,176	1,172	1,196	1,197	1,204	1,232	5.1
Services	3,223	3,292	3,404	3,358	3,484	3,636	3,851	3,859	14.9
Government	2,917	2,940	2,996	3,028	3,027	2,992	3,101	3,151	4.1
Federal, Civilian	452	462	468	469	466	471	480	492	4.9
Military	397	400	400	407	406	405	408	422	3.7
State & Local	2,069	2,078	2,129	2,152	2,155	2,116	2,213	2,236	3.9

TCU is transportation, communication, and utilities. FIRE is finance, insurance, and real estate
* All data are seasonally adjusted at annual rates
** Earnings is the sum of wages and salaries, other labor income, and income earned by sole proprietors
Source: Bureau of Economic Analysis, U.S. Department of Commerce

this slump continue or stabilize at current levels, it will be good news for domestic inflation.

With the easing of inflationary pressure coupled with weakness in some sectors of the economy, the Federal Reserve has eased monetary policy. As a consequence, a short-term improvement in the housing market has occurred. June housing starts reversed a nearly two year decline, advancing 7.0 percent.

All of the gains in housing starts were in multifamily structures. Single family housing starts were off a modest 0.2 percent. The boost in the housing market resulted from lower long-term interest rates. These rates had dropped even before the Federal Reserve eased monetary policy. Lower short-term interest rates resulted immediately from the easing in monetary policies, with even lower long-term rates likely.

It is possible that the improvement in the housing start figures will not be a mere one month blip. There is a regional aspect to the good news in housing. The bloated northeastern housing market is slumping. There are scattered reports of some decreases in home prices in the region.

The long downturn in housing starts that had characterized the data until June typifies prerecession conditions. It is natural to ask if the housing advance can be maintained. Income advances are good and are capable of supporting further gains in housing, as long as interest rates do not increase. Thus, the near-term demand for housing remains healthy.

A problem exists on the supply side. Home builders are reluctant to expand at this point in the business cycle. Most builders would be delighted to build a new house based on a firm order. Those same builders would be reluctant to build on speculation. The housing industry, particularly builders, get whipsawed by rapid changes in monetary policy.

If price advances remain moderate and interest rates remain low, the six and one-half year expansion will continue. Because of the advanced stage of the current expansion, however, rates of growth likely will be moderate.

Could future growth rates quicken? At this point in a business cycle, the usual limitations upon rapid expansion and growth are due to capacity constraints. 1988 was a good year for capacity expansion, and 1989 also could be good, depending on whether investors believe the gloom and doom forecasters. The result of added capacity is an easing of price pressures.

On the income side, we see high levels of employment. Those levels of employment, coupled with moderate wage advances, imply that an ample income pool will be available for purchases.

On the demand side, there has been some weakness in housing that could be reversed, and there is weakness in retail sales. The retail sales weakness has been especially noticeable in the automobile market.

A boost in short-term auto sales could come from the recent announcements of major price advances for the 1990 models. U.S. auto makers have cited the need for more required equipment as the reason for price increases. Thus, consumers may be stimulated to buy year-end 1989 models.

Early July figures tend to support this speculation. In the first ten days of July, auto sales advanced 8.9 percent over year ago levels, and in the second ten days they advanced 2.4 percent over year ago levels. At best, auto sales stimulated by announcements of higher prices for the next model year will shift sales from the fourth quarter into the third quarter.

In the longer term, auto purchases are determined by three major factors. First, the availability of after tax income to the consumer; second, the condition of the stock of automobiles held by the public; and third, the relative price and terms of the auto purchase.

We've already indicated that incomes appear to be in good shape. Stocks of auto-

Table II
Employment in Nebraska

	Revised May 1989	Preliminary June 1989	June % Change vs. Year Ago
Place of Work			
Nonfarm	715,799	718,713	3.8
Manufacturing	97,695	98,750	3.4
Durables	47,610	48,434	2.5
Nondurables	50,085	50,316	4.2
Mining	1,813	1,830	4.5
Construction	27,365	28,244	6.7
TCU*	47,323	47,563	5.3
Trade	184,192	183,815	3.2
Wholesale	52,845	52,811	4.4
Retail	131,347	131,004	2.8
FIRE**	49,093	49,569	2.8
Services	166,010	167,842	5.3
Government	142,308	141,100	2.2
Place of Residence			
Civilian Labor Force	813,418	821,217	-0.15
Unemployment Rate	2.5%	3.6%	

*Transportation, Communication, and Utilities
**Finance, Insurance, and Real Estate

Source: Nebraska Department of Labor

Table III
Price Indices

	June 1989	% Change vs. Year Ago	YTD % Change vs. Year Ago
Consumer Price Index - U* (1982-84 = 100)			
All Items	124.1	5.2	5.0
Commodities	117.2	5.5	5.1
Services	131.6	4.9	4.9
Producer Price Index (1982 = 100)			
Finished Goods	114.1	5.7	5.6
Intermediate Materials	112.6	4.8	6.1
Crude Materials	103.9	5.8	8.1
Ag Prices Received (1977 = 100)			
Nebraska	154	2.0	12.0
Crops	137	10.5	36.7
Livestock	166	-1.2	2.5
United States	146	6.6	12.4
Crops	137	7.9	21.3
Livestock	155	5.4	6.1

U* = All urban consumers
Source: U.S. Bureau of Labor Statistics

mobiles held by the public are relatively new and are in very good condition. Relative prices may be high with the new models. If so, auto sales will depend on how good a deal auto dealers can cut with their customers. Those terms will depend, in part, on how anxious auto manufacturers are to increase sales volumes.

Further weakness in future auto sales is also evident in an otherwise buoyant report on consumer confidence. In May, only 6.5 percent of the respondents to the Conference Board survey said they would buy a car in the next six months. That figure is the lowest level since the first quarter of 1983. In June 1988, almost 9 percent of those surveyed said that they would buy a car.

The emerging picture is of a potential auto buyer who is able, but who does not need, to buy. The prospective buyer's own automobile is relatively new and can deliver an additional year or two of service. The buyer will deal if prices and terms are favorable. As a result, we do not expect a big rebound in auto sales. It is conceivable that the American consumer may decide to increase his or her savings rate.

In summary, there may be a rebound in housing, but it is difficult to see an improvement in auto sales. Consequently, the chances of large economic growth rates in the near future are slim at best.

Table IV
City Business Indicators
April 1989 Percent Change from Year Ago

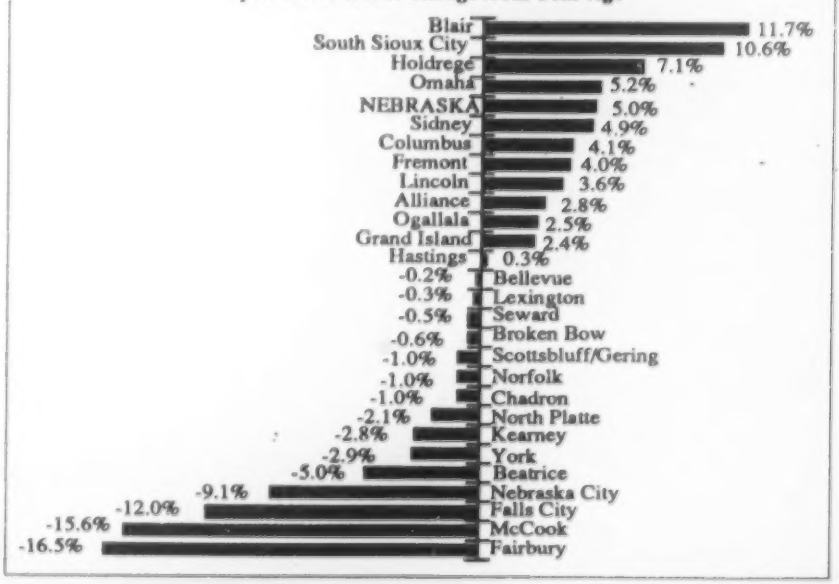
The State and Its Trading Centers	Employment (1)	Building Activity (2)
NEBRASKA	1.8	-3.5
Alliance	2.1	210.2
Beatrice	1.4	-23.2
Bellevue	1.9	-32.6
Blair	1.9	1,205.5
Broken Bow	1.1	-34.8
Chadron	2.3	112.9
Columbus	2.4	75.0
Fairbury	2.4	-89.5
Falls City	0.8	-22.2
Fremont	2.1	38.2
Grand Island	2.1	-12.1
Hastings	2.3	-11.6
Holdrege	1.2	368.3
Kearney	2.1	-71.9
Lexington	3.2	223.2
Lincoln	1.8	-12.7
McCook	0.7	-92.3
Nebraska City	1.5	-44.4
Norfolk	2.2	-21.8
North Platte	2.1	-9.3
Ogallala	1.1	11.8
Omaha	1.9	-1.2
Scottsbluff/Gering	1.3	112.8
Seward	2.3	-48.4
Sidney	2.7	23.8
South Sioux City	1.0	488.0
York	1.2	-23.8

(1)As a proxy for city employment, total employment (labor force basis) for the county in which a city is located is used

(2)Building activity is the value of building permits issued as a spread over an appropriate time period of construction. The U.S. Department of Commerce Composite Cost Index is used to adjust construction activity for price changes

Sources: Nebraska Department of Labor and reports from private and public agencies

Figure I
City Business Index
April 1989 Percent Change from Year Ago



Nebraska Outlook

In contrast to construction activity in the U.S. so far this year, Nebraska construction activity is doing well. According to the F.W. Dodge report, accumulated total square footage of all buildings through June has advanced 8.6 percent over last year. The number of total construction projects, including nonbuilding construction, has shown a 13.4 percent gain through June.

Recent rains in the state have helped some areas catch up on moisture conditions. According to the Nebraska Agriculture Statistics Service, only one of its eight reporting regions in Nebraska, the northwest, now reports less than 50 percent of normal precipitation between April 1 and July 21 of this year.

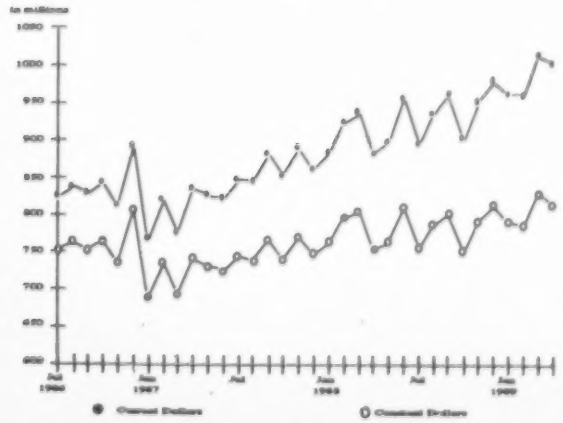
Earlier this year, several regions were below the 50 percent mark. While topsoil

Table V
Net Taxable Retail Sales of Nebraska Regions and Cities

Region Number and City (1)	City Sales (2) April 1989 (000s)	City Sales (2) % Change vs. Year Ago	Region Sales (2) April 1989 (000s)	Region Sales (2) % Change vs. Year Ago	Region Sales (2) YTD % Change vs. Year Ago
NEBRASKA	$851,039	15.7	$977,087	13.6	8.8
1 Omaha	302,505	16.0	375,987	13.7	10.5
Bellevue	12,524	7.5	*	*	*
Blair	4,362	1.8	*	*	*
2 Lincoln	117,985	13.6	137,161	12.1	5.4
3 South Sioux City	4,399	9.2	6,537	8.5	-2.2
4 Nebraska City	3,232	-11.2	17,215	1.4	1.9
6 Fremont	15,546	9.0	28,786	5.1	2.6
West Point	2,904	6.6	*	*	*
7 Falls City	1,732	-20.9	8,216	-10.6	-2.5
8 Seward	4,056	9.4	13,604	-2.6	0.8
9 York	6,346	0.3	15,256	15.2	10.9
10 Columbus	13, 991	6.1	26,252	5.6	7.3
11 Norfolk	17,618	3.6	32,871	5.3	7.9
Wayne	2,341	-18.1	*	*	*
12 Grand Island	33,473	10.4	47,318	11.1	9.9
13 Hastings	15,273	5.2	24,132	0.1	6.9
14 Beatrice	7,141	-4.9	16,443	-5.1	1.1
Fairbury	2,521	-10.3	*	*	*
15 Kearney	18,911	11.1	27,024	9.6	11.3
16 Lexington	4,817	-12.1	14,935	-0.9	9.4
17 Holdrege	4,090	3.5	7,519	-0.3	5.7
18 North Platte	14,717	-0.5	18,550	-0.8	3.8
19 Ogallala	5,530	8.9	11,977	10.4	11.0
20 McCook	7,466	-3.0	10,580	-5.7	4.3
21 Sidney	3,667	11.8	7,356	1.5	8.0
Kimball	1,435	-14.8	*	*	*
22 Scottsbluff/Gering	14,356	-6.9	23,878	10.3	11.2
23 Alliance	4,945	-3.3	12,317	-5.7	3.6
Chadron	2,280	-8.0	*	*	*
24 O'Neill	4,217	4.5	12,828	5.5	12.6
Valentine	2,128	3.2	*	*	*
25 Hartington	1,600	10.6	8,272	5.2	1.2
26 Broken Bow	3,566	7.9	12,134	5.1	6.8

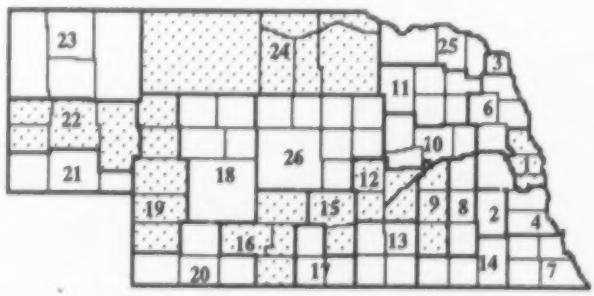
(1) See region map
(2) Sales on which sales taxes are collected by retailers located in the state. Region totals include motor vehicle sales
* Within an already designated region
Compiled from data provided by the Nebraska Department of Revenue

Figure II
Nebraska Net Taxable Retail Sales
(Seasonally Adjusted)



(1) The Consumer Price Index (1982-84 = 100) is used to deflate current dollars into constant dollars

Figure III
Region Sales Pattern
YTD as Percent Change from Year Ago



Shaded areas are those with sales gains above the state average. See Table V for corresponding regions and cities

conditions generally have improved across the state, subsoil moisture remains 90 percent short. That implies that shortfalls in precipitation during the remainder of this growing season could severely impact dry land crops.

First quarter personal income figures are in for Nebraska. The data produced by the Bureau of Economic Analysis of the U.S. Department of Commerce are reported in Table I. Total personal income advanced 8.1 percent in the first quarter versus year ago.

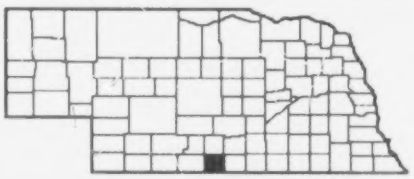
Farm personal income percentage gains of 13.5 percent outpaced the total. Table I also displays the volatility of Nebraska farm income. Farm personal income nearly doubled between second quarter 1987 and second quarter 1988. The farm income series is influenced heavily by weather conditions and the timing and degree of federal agricultural payments to farmers.

In the nonfarm income area, industries where earnings posted the highest gains were wholesale trade, at 10.8 percent, and services, at 14.9 percent. Total nonfarm personal income advanced 7.4 percent from the previous year.

Retail sales continued to advance in Nebraska throughout April. On a year-to-date basis, the state as a whole advanced 8.8 percent. (See Table V.) The Omaha, York, Kearney, Ogallala, Scottsbluff/Gering, and O'Neill regions led the state with double digit gains through April.

County of the Month

Harlan



Alma--County Seat

Size of county: 575 square miles, ranks 53rd in the state
Population: 4,000 (estimated) in 1988, a change of -6.9 percent from 1980
Median age: 39.0 years in Harlan County, 29.7 years in Nebraska in 1980
Per capita personal income: $14,073 in 1987, ranks 44th in the state
Net taxable retail sales ($000): $15,266 in 1988, a change of +6.3 percent from 1987; $4,588 during January-April 1989, a change of +3.1 percent from the same period one year ago
Number of business and service establishments: 118 in 1986; 68.6 percent had less than five employees
Unemployment rate: 2.8 percent in Harlan County, 3.6 percent in Nebraska for 1988
Nonfarm employment (1988):

	State	Harlan County
Wage & salary workers	688,146	901
	(percent of total)	
Manufacturing	13.8%	1.6%
Construction and Mining	3.8	1.6
TCU	6.5	4.2
Retail Trade	18.5	21.1
Wholesale Trade	7.3	17.5
FIRE	7.0	5.1
Services	23.0	13.3
Government	20.1	35.6
Total	100.0%	100.0%

Agriculture:
Number of farms: 465 in 1987, 453 in 1982
Average farm size: 686 acres in 1987
Market value of farm products sold: $55.5 million in 1987 ($119,400 average per farm)

Sources: U.S. Bureau of the Census, U.S. Bureau of Economic Analysis, Nebraska Department of Labor, Nebraska Department of Revenue

Merlin W. Erickson

Business in Nebraska

PREPARED BY BUREAU OF BUSINESS RESEARCH
Association for University Business & Economic Research

Business in Nebraska is issued as a public service and mailed free of charge upon request to 200 CBA, University of Nebraska-Lincoln, Lincoln, NE 68588-0406. Copyright 1989 by Bureau of Business Research, University of Nebraska-Lincoln.

August 1989, Volume 44 No. 539

University of Nebraska-Lincoln-- Martin Massengale, *Chancellor*
College of Business Administration--Gary Schwendiman, *Dean*

Bureau of Business Research
F. Charles Lamphear, *Director*
Merlin W. Erickson, *Research Associate*
Margo Young, *Editorial Assistant*
John S. Austin, *Statistical Coordinator*
David D. DePruitte, *Statistical Technician*
Jodi Benson, *Staff Secretary*
Barbara Sumsion, *Composing Technician*
Lisa Darlington, *Staff Secretary*

The University of Nebraska-Lincoln does not discriminate in its academic, admission, or employment programs and abides by all federal regulations pertaining to same.

Nonprofit Org.
U. S. Postage
PAID
Lincoln, Nebraska
Permit No. 46

CONGRESSIONAL INFO SERVIC270238
SRI BR
4520 EAST-WEST HWY
BETHESDA, MD 20814